Remarks

Claims 1, 2, 4-8, 12-15, 18-21, 23, 24, 27-29, 36, 40, 44 and 45 are pending. Claims 1, 2, 4-8, 12-15, 18-21, 23, 24, 27-29, 36, 40, 44 and 45 are rejected. Claim 46 is new.

Claim 20 is rejected under 35 U.S.C. 112, first paragraph.

With regard to claim 20, the Examiner indicates that

> The mention that the microbubble "operates as a high frequency, high precision acoustic source" in the originally filed disclosure does not provide the necessary teachings of the means by which to produce, control, and direct the shockwave so it "operates as a high frequency, high precision acoustic source".
>
> Office Action, January 8, 2008, p. 2.

Claim 20, however, does not include the phrase "operates as a high frequency, high precision acoustic source."

Claims 3, 7, 8 and 11-13 are rejected under 35 U.S.C. 112, second paragraph. (Claims 3 and 11, however, were cancelled prior to the October 30, 2007 Request for Continued Examination. Claims 12 and 13 were amended to depend from claim 1 in the amendment dated October 30, 2007).

With regard to claims 7 and 8, the Examiner indicates that "it is not the recitation of the terms mico-Newtons and nano-Newtons . . . per se, but the range implied by the use of the term 'level' in conjunction with these recitations." Office Action, January 8, 2008, p. 3. Claims 7 and 8, however, do not include the word "level."

Claims 1, 2, 4-8, 13-15, 18-21, 23, 24, 27-29, 36, 40, 44 and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Pat. No. 6,932,914 (LeClair) in view of U.S.

Pat. No. 6,113,570 (Siegel). Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over LeClair in view of Siegel and in further view of U.S. Pat. No. 6,605,453 (Ozkan).

With regard to claim 1, Siegel does not teach propagating at least one acoustic wave through the material to exert a radiation force at an exterior surface of the microbubble to controllably manipulate the microbubble within the material without causing the destruction of the microbubble. The Examiner asserts that "Siegel et al teach controllably manipulating microbubbles with an acoustic field." Office Action, January 8, 2008, p. 5. Assuming, *arguendo*, that Siegel teaches controllably manipulating microbubbles with an acoustic field, such manipulation via the acoustic field appears to destroy the microbubbles: "This may be due to the effect of microbubbles within the echo contrast agent that, when combined with ultrasonic energy, leads to increased cavitation of vascular fluid surrounding the thrombosis." Siegel, col. 6, ll. 27-31.

With regard to claim 1, the Examiner asserts that "[i]t would have been obvious to . . . employ the acoustic energy directing of Siegel et al in the method of LeClair, since this would direct the bubbles," Office Action , January 8, 2008, p. 5. The Examiner's reasoning, however, lacks technical merit. The cavitation and target bubbles of LeClair are created in their desired positions:

> In general, the formation of cavitation bubbles from a focussed energy source can be described as follows. The energy from a cavitation initiation device is focused into a small volume in proximity to a work piece surface. The intense energy focused into the small focus volume is absorbed by the fluid, causing rapid boiling and expansion of vaporized gasses.
>
> LeClair, col., 5, ll. 23-29.
>
> Target bubbles can be created in any direction in 3d space relative to the center of the working bubble. All that is required is that there be a clear line of sight (relative to the radiation source needed to create the bubble) to the projected position of the target bubble; that the target bubble is formed within a given time period

> of the collapse of the working bubble; and that the target bubble be within a given proximity of the working bubble.
>
> LeClair, col. 5, ll. 12-20.

The purported acoustic energy directing techniques of Siegel would serve no purpose in LeClair and, as discussed above, would appear to destroy the bubbles of LeClair.

With regard to claim 1, the Examiner further asserts that "[i]t would have been obvious . . . to employ the jet forming method of LeClair in the method of Siegel et al, since this would cause more effective removal of the thrombus," Office Action , January 8, 2008, p. 5. Modifying Siegel with LeClair, however, impermissibly alters Siegel's principle of operation. See, MPEP 2143.01 VI. The purported manipulation (and destruction) of microbubbles with an acoustic field in Siegel appears to "[lead] to increased cavitation of vascular fluid surrounding the thrombosis," Siegel, col. 6, ll. 29-31, whereas, in LeClair, a target bubble is used to direct a micro-jet toward a work surface:

> The target bubble serves to attract the re-entrant micro-jet by creating a hydrodynamic condition similar to that of a solid work surface or an orifice. However, the target bubbles, unlike solid work surfaces, are transparent to the jets, and allow the jets to slice through them unimpeded. Target bubbles can therefore be used to direct the powerful re-entrant micro-jets toward a work surface or object without the need for an orifice.
>
> LeClair, col. 5, ll. 20-27.

The "jet forming method of LeClair" appears to be incompatible with the techniques of Siegel: LeClair cannot be combined with Siegel as Siegel appears to destroy its bubbles.

Claims 2, 4-8, 12-15, 18-20 and 44 depend from claim 1. For the reasons claim 1 is patentable, claims 2, 4-8, 12-15, 18-20 and 44 are patentable.

For the reasons claim 1 is patentable, claim 21 is patentable.

Claims 23, 24, 27-29, 36, 40 and 45 depend from claim 21. For the reasons claim 21 is patentable, claims 23, 24, 27-29, 36, 40 and 45 are patentable.

With regard to claim 46, Siegel does not teach propagating at least one acoustic wave through the material to exert a radiation force at an exterior surface of the microbubble to controllably manipulate the microbubble within the material without causing the destruction of the microbubble by the propagating of the at least one acoustic wave. The Examiner asserts that "Siegel et al teach controllably manipulating microbubbles with an acoustic field." Office Action, January 8, 2008, p. 5. Assuming, *arguendo*, that Siegel teaches controllably manipulating microbubbles with an acoustic field, such manipulation via the acoustic field appears to destroy the microbubbles: "This may be due to the effect of microbubbles within the echo contrast agent that, when combined with ultrasonic energy, leads to increased cavitation of vascular fluid surrounding the thrombosis." Siegel, col. 6, ll. 27-31.

While Applicant's Attorney does not necessarily agree with the Interview Summary dated March, 17, 2008, Applicant's Attorney did find the March 6, 2008 interview with the Examiner helpful.

Applicant's Attorney submits that the claims are in a condition for allowance. Applicant's Attorney respectfully requests a notice to that effect. Applicant's Attorney also invites a telephone conference if Examiner believes that it will advance the prosecution of this application.

Please charge any fees or credit any overpayments as a result of the filing of this paper to our Deposit Account No. 02-3978.

Respectfully submitted,

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